SAMSUNG

ELECTRONIC CASH REGISTER

ER-2710,2715

SERVICE MANUAL

CONTENTS

NOTE: All specifications are subject to change without prior notice.

1. EXPLANATION OF CIRCUITS

1. OVERVIEW

A) The battery back up On/Off Control S/W must be turned on.

After this switch is turned on the Ni-Cad battery can back up power to RAM and RTC. Prior to installation, you must turn this switch on. It is located below the printer cover and upper side of the printer unit.

B) Prior to programming at installation, you must clear all the programming contents by MC(MASTER CLEAR) mode.

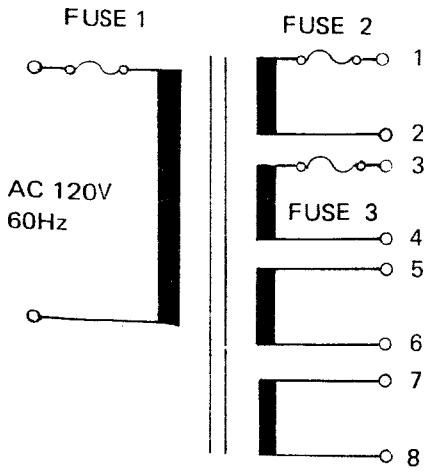
To master clear the Register, turn Control Lock key ("OW" or "C") to MC mode, and hold down the "00" key on the cash register keyboard. While continuing to hold this "00" key down, the main power ON.

Continue to hold the "00" key down until the receipt printer stops printing and the display shows 0.00.

2. POWER MODULE CIRCUIT

A) Transformer

The voltage of the secondary line is shown below.



PIN NO.	WIRE COLOR	VOLTAGE
1 2	RED RED	19.5 VAC ±15%
3 4	BLU BLU	9.5 VAC ±15%
5 6	ORG ORG	26 VAC ±15%
7 8	YEL YEL	4.5 VAC ±15%

B) Fuse

Fuse 1	125V 1A	NORMAL TYPE
Fuse 2	125V 2A	SLOW BLOW
Fuse 3	125V 1A	NORMAL TYPE

C) POWER SUPPLY CIRCUIT

VDD (DC 5V)

The VDD voltage is used for the system logic and provides the stabilizing power source for the circuit through the Regulator MC7805.

VPF (DC 11.5V)

The VPF voltage is used for the reference voltage when the system power fails.

VPR (DC 20V)

The VPR voltage is used for the source voltage of the printer drive circuit, printer motor and drawer circuit.

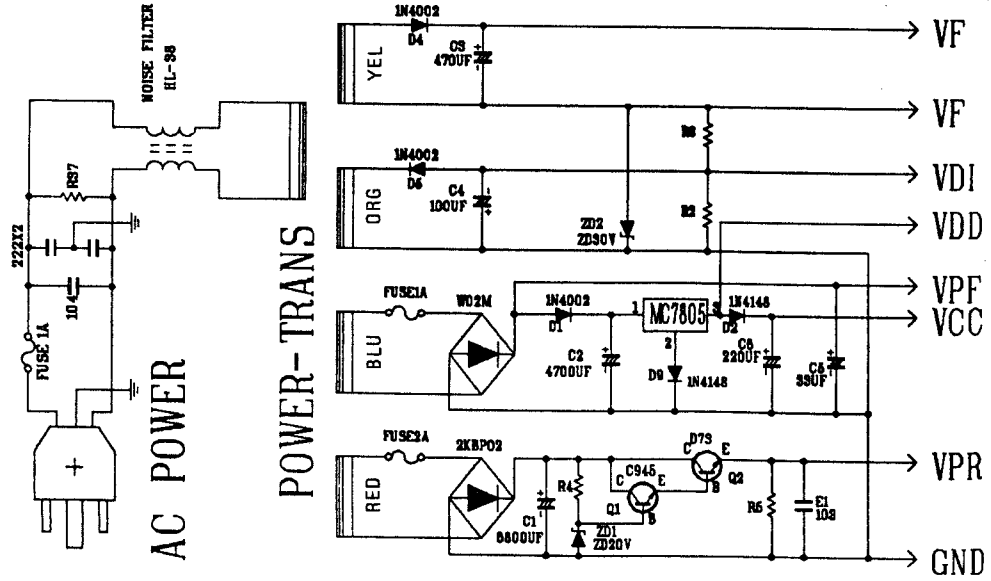
The base voltage is controlled by ZD1 zener doiode. For providing more current the circuit is made of the Darlington circuit which is composed of TR C945 and D73Y.

VF(DC 4V)

The VF voltage is used for providing the power to the FILAMENT of the DIGITRON.

VDI (DC -30V)

This voltage is used for providing the power to the IR2C05 which drives DIGITRON.



3. RESET CIRCUIT

The reset circuit prevents the CPU from starting to operate before the system is fully powered-up and initialized.

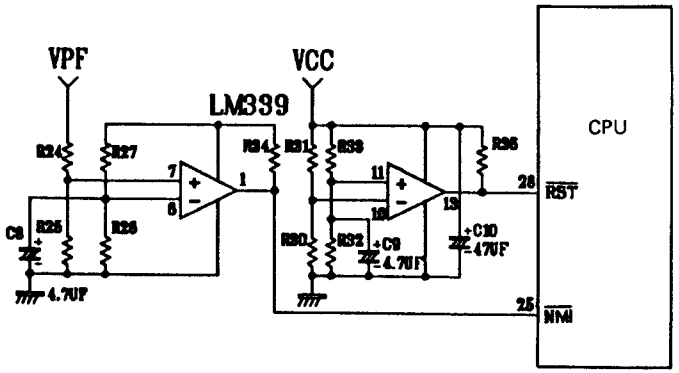
Then 30ms later after the power is applied, RESET goes high and CPU begin functioning. This signal is generated from the PIN13 because of the difference of the time constant which is applied to the PIN10, 11 of the comparator LM339 after the power-on.

4. POWER FAILURE CIRCUIT

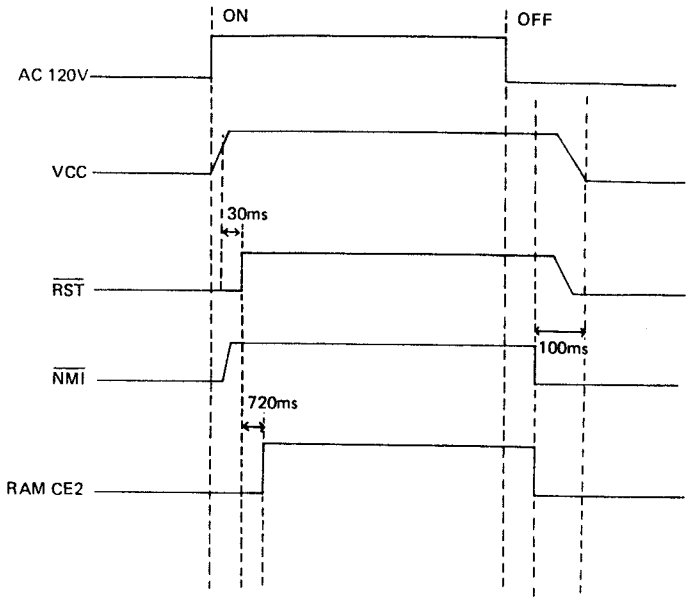
The power failure signal is generated when the power is off or power failure state.

The purpose of this signal is to save the start of the CPU and its data to the external RAM before the VDD goes down below the normal operation voltage.

This signal is generated from the PIN1 by the difference of the time constant of VCC and VPF which is applied to the PIN7 of the comparator LM339.

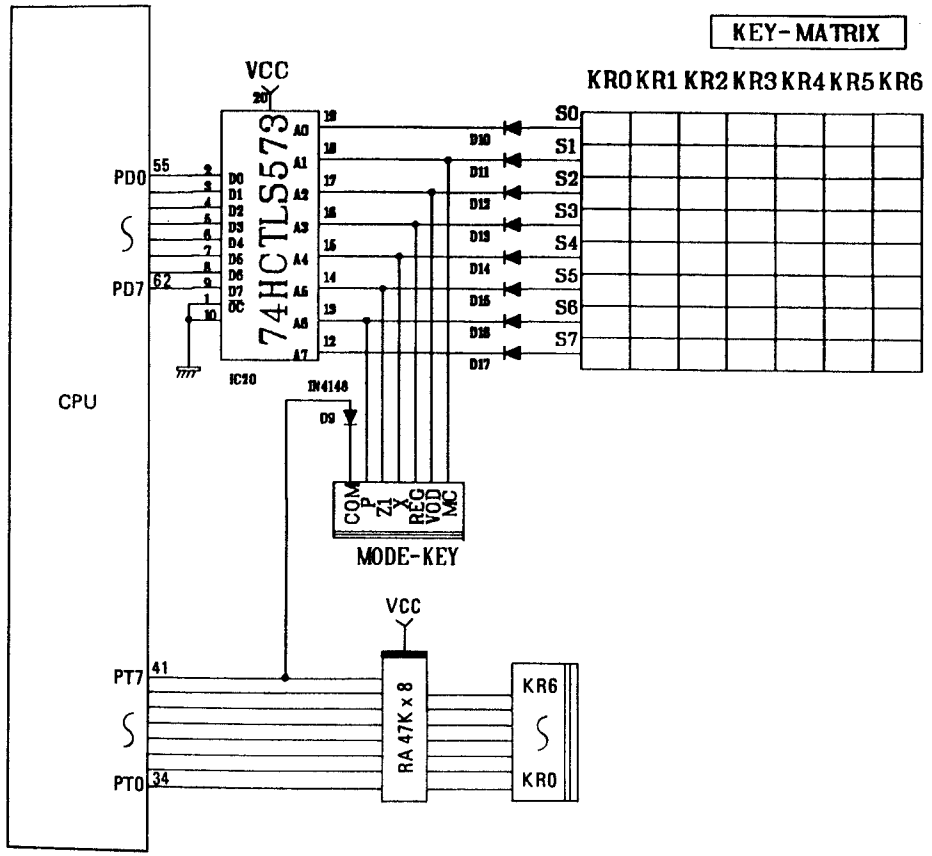


5. POWER ON/OFF TIMING CHART



3. KEYBOARD CIRCUIT

D0 ~ D7 of the CPU are connected to the keyboard matrix through the latch (IC20) as a key scan timming signal, and the key signals are received by the PTO ~ PT6 and PT7 (mode key to be a return signal).

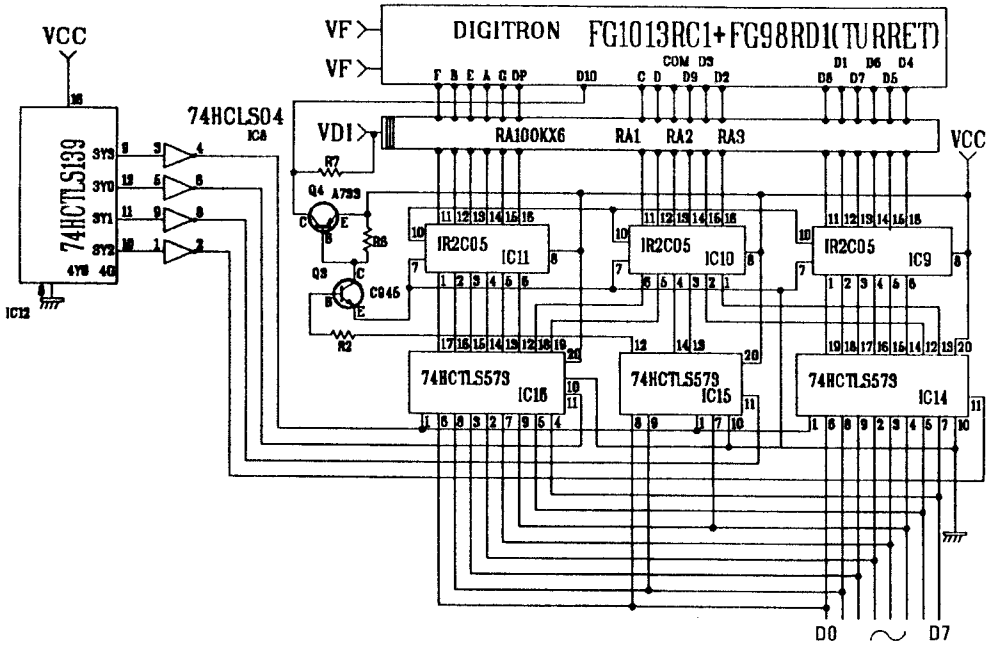


7. DISPLAY CIRCUIT

DIGITRON is controlled by the CPU through the latches (74HCTLS573) and the driver (IR2C05).

The CPU transfer the DIGIT signals and SEGMENT signals to the latches (74HCTLS573).

These signals are amplified by the IR2C05.



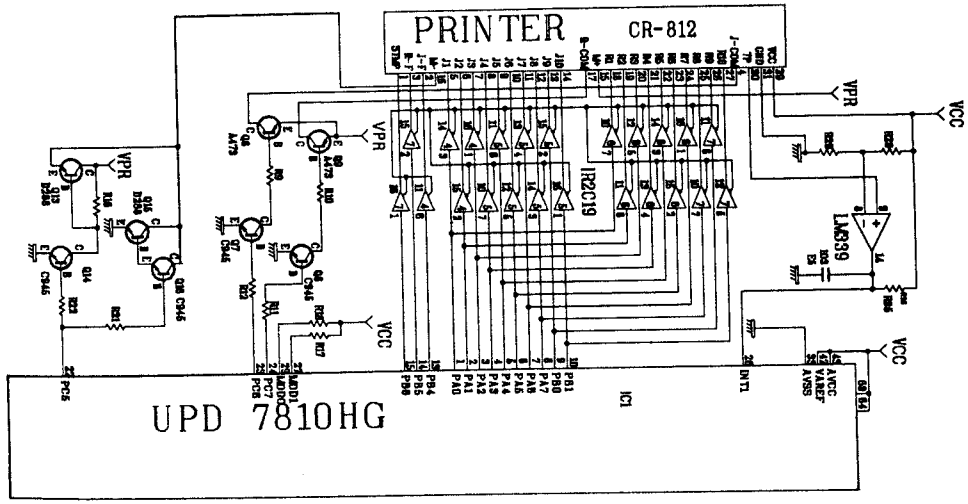
8. PRINTER CIRCUIT

The printer consists of 10 receipt trigger magnets and 10 journal trigger magnets. VPR is supplied to the trigger magnets and a signal from the CPU supplies ground to the appropriate magnet causing it to pull in. This stops the movement of the type wheel at a designated position.

At this time, the motor receives a signal from the CPU and allows VPR to turn on. When the motor turns on, timing signal is generated by the printer (T,S) and returns to the CPU to indicate the timing position of the type wheels. Each type wheel has 14 locations. The timing signal tells the CPU when to send a pulse to the trigger magnets of the printer to set the type wheels to formulate the desired characters.

All signals from the printer are controlled by a gating circuit, IC4, IC5, IC6, IC7. These IC's are IR2C19 and connect the outputs to printer ground when the inputs from the CPU go from 0V to 5V. The output goes from 20V to 0V

When the signal at PC7 of the CPU becomes the "HIGH" level, TR C945 and A473 are turned "ON".
Thus R-COM of the PRINTER becomes 20V.
At this time, if the signal at PA0 of the CPU becomes the "HIGH" level, then IR2C19 is turned "ON".
Thus R1 solenoid is turned "ON".
The TR C945 and D288 are the motor break circuit and when PC5 becomes low this circuit immediately stops the motor.



9. DRAWER CIRCUIT

The Drawer is activated by using the signal PC4 from the UPD7810.

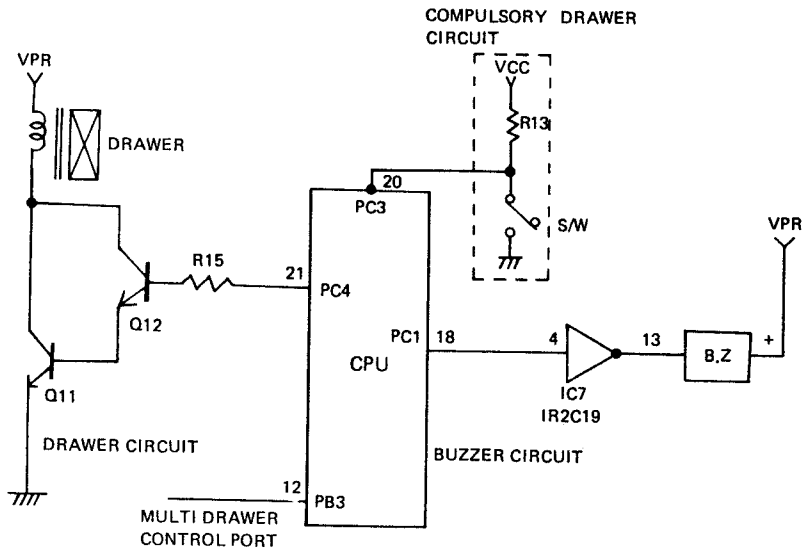
This signal is normally LOW. When it goes HIGH which causes TR C945Y and D288Y to go on and activate the Drawer Solenoid.

10. BUZZER CIRCUIT

The Buzzer is activated by the normal input of the key and the error state.

When PC1 signal in the CPU is set high, IR2C19 is turned on.

Thus, Buzzer sounds.



* COMPULSORY DRAWER CIRCUIT (OPTION)

When the drawer is opened, the switch is going to 'ON', so the PC3 PIN of the CPU goes to the low level

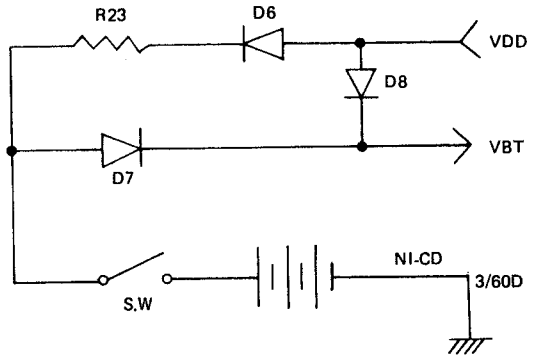
* MULTI DRAWER (OPTION)

Multi drawer circuit is equal to drawer circuit except PB3 instead of PC4.

11. BATTERY CIRCUIT

In the normal state of the operation, VDD voltage goes to the battery for the charge through D6, R23.

At power off, Battery voltage goes to the VCC of RAM and VCC of RP5C15 through D7. This operation is able to keep saving the data of the RAM and going the clock normally for the DATE and TIME.



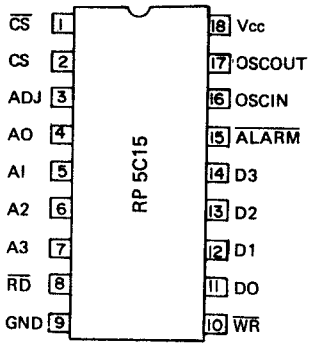
12. REAL TIME CLOCK(RTC) CIRCUIT

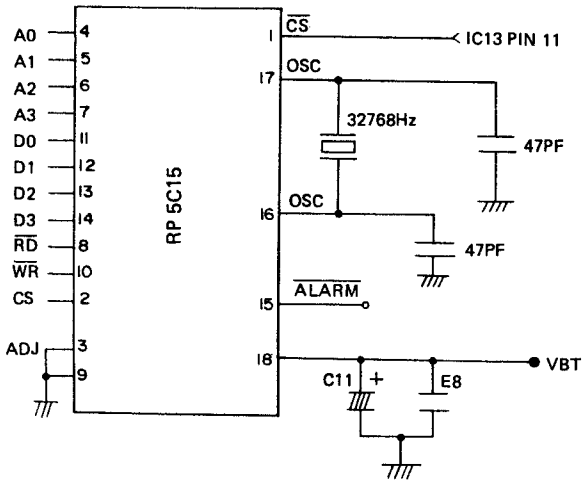
RP5C15 is a real time-clock LSI which is capable of reading/writing like RAM chip. It consists of 8 counters and an alarm register.

All data uses a BCD code. Any communication between the CPU and RP5C15 is performed by a 1 bit data bus and 1 selected line.

PIN DESCRIPTION

CS, CS	:	Chip select
CLKOUT	:	Clock output In the case of System–3 Clkout = 1024Hz
A0 – A3	:	Address line
RD	:	Read cycle status form CPU
GND	:	0V
WR	:	Write cycle status form CPU
D0 – D3	:	Data bus
ALARM	:	Alarm output
OSCIN	:	X-TAL pin for internal oscillator
OSCOUT	:	32.768KHz
VCC	:	+5V

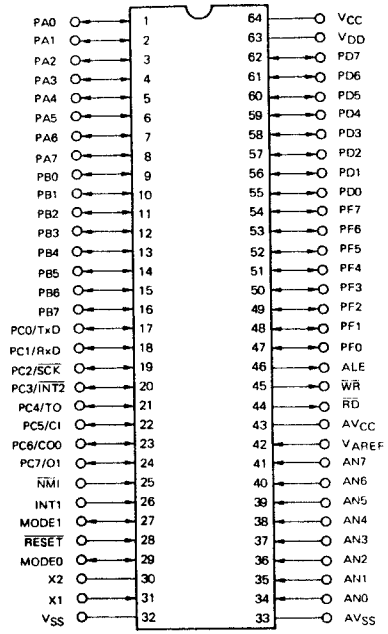




2. PARTS STANDARD

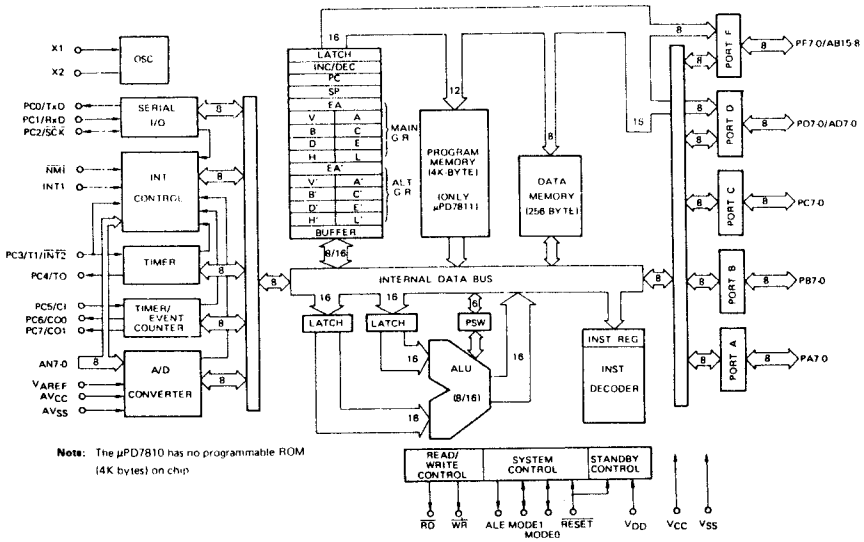
UPD 7810HG PIN CONFIGURATION DIAGRAM

Pin Configuration Diagram (Top View)



PA7 – 0	:	Port A
PB7 – 0	:	Port B
PC7 – 0	:	Port C
PD7 – 0	:	Port D
PF7 – 0	:	Port F
NMI	:	Non Maskable Interrupt
INT 1	:	Interrupt Request

MODE0, 1:		Mode 0, 1
X1, X2	:	Crystal
AN7 – 0	:	Analog Input
RD	:	Read Strobe
WR	:	Write Strobe
ALE	:	Address Latch Enable
RESET	:	Reset
VAREF	:	Reference Voltage



Note: The μPD7810 has no programmable ROM (4K bytes) on chip

SAMSUNG SEMICONDUCTOR

The Expertise & Experience to Excel

Best Quality
Quick Delivery Good Price

64K SRAM

KM6264A/KM6264AL

8,192 WORD×8 BIT CMOS STATIC RAM

FEATURES

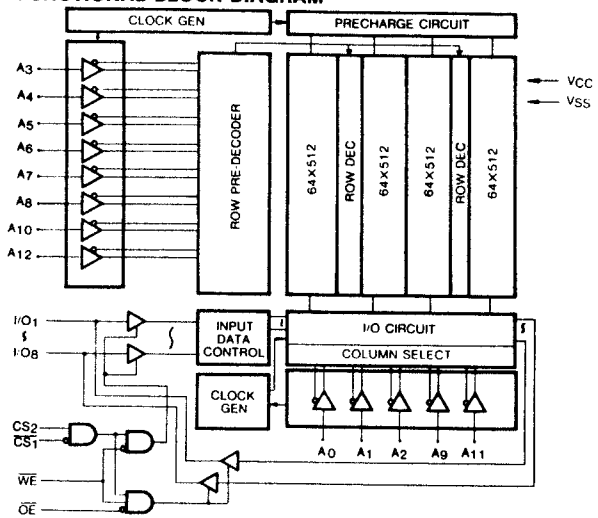
- Fast Access Time 100, 120, 150ns (max.)
- Low Standly Current: 100μA (max)
- Low Data Retention Current: 50μA (max.)
- Capability of Battery Back-up Operation
- Data Retention Voltage: 2.0V (min.)
- Single 5V±10% supply
- TTL compatible inputs and outputs
- Pin compatible with 64K EPROMS
- Fully Static Operation
- Standard 28 pin DIP
- Common I/O, Tristate Output

GENERAL DESCRIPTION

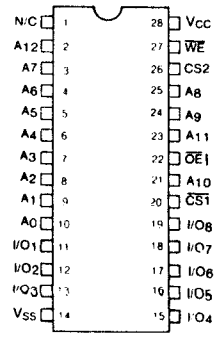
The KM6264A/AL is a 65,536-bit high speed static random access memory organized as 8,192 words by 8 bits. This device is fabricated using advanced SST'S CMOS technology. The KM6264A/AL has an output enable input for precise control of the data outputs. It also has chip enable inputs for the minimum current power down mode. The KM6264A/AL has been designed for high speed and low power applications. It is particularly well suited for battery backup nonvolatile memory applications.

Two versions are available-the KM6264A and KM6264AL. The L-version is specified with lower standby and data retention currents than the standard version. Otherwise the two versions are identical.

FUNCTIONAL BLOCK DIAGRAM



PIN CONFIGURATION



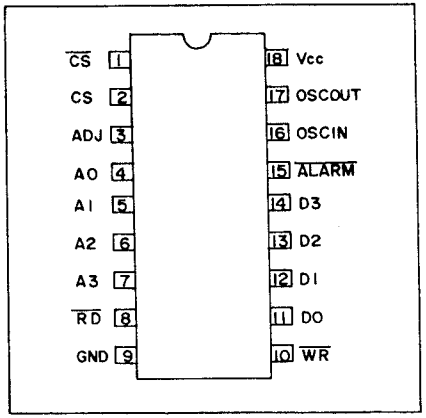
PIN NAMES

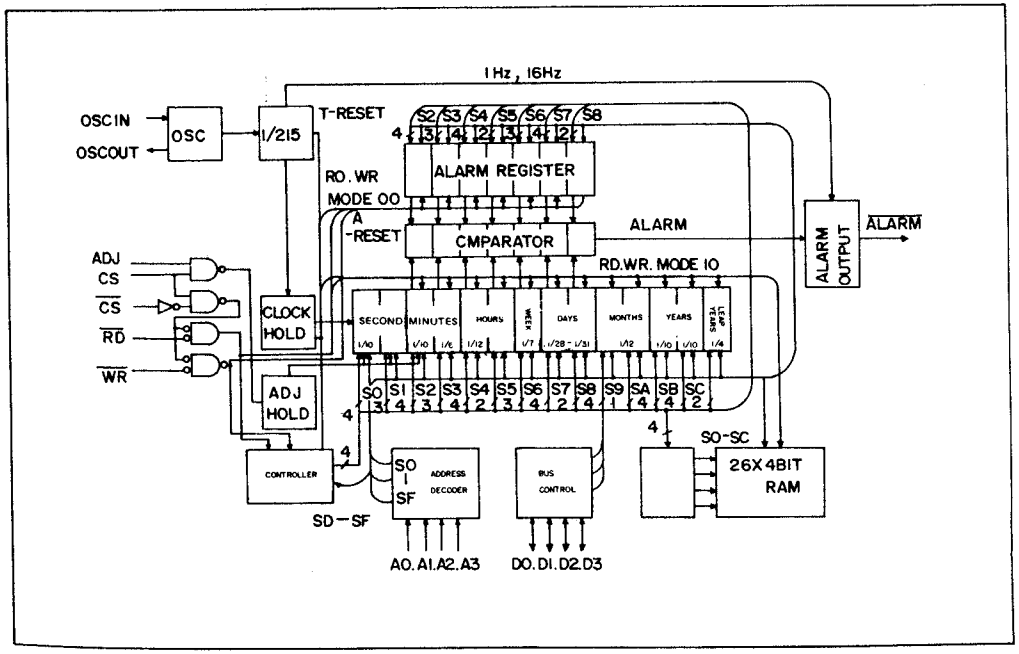
A0—A12	Address Inputs
$\overline{WE}$	Write Enable
$\overline{CS1}$, CS2	Chip Select
$\overline{OE}$	Output Enable
I/O1—I/O8	Data Input/Output
VCC	+5V Power Supply
VSS	Ground

RP5C15 (REAL TIME CLOCK)

Features:

- Direct connection to CPU
- 4-bit bidirectional bus D0—D3
- 4-bit address inputs A0—A3
- Internal counters for time (hours, min., sec.) and date (100 years, leap years, months, days, and days-of-the-week)
- Choice of 24-hour or 12-hour (AM/PM) system
- All clock data expressed in BCD code
- ±30 sec. adjustment function
- Provision for battery backup
- Internal 26 x 4-bit RAM
- Alarm signal, 16Hz clock signal or 1Hz clock signal output



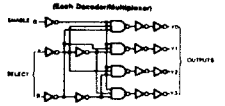


KS54HCTLS
KS74HCTLS **139** *Dual 1-of-4 Decoder/Multiplexers*

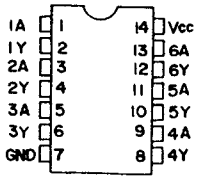
PIN CONFIGURATION

FUNCTION TABLE

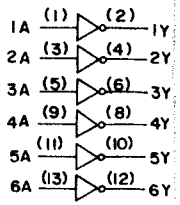
LOGIC DIAGRAM



KS74HCTLS04 (Hex Inverters)



LOGIC DIAGRAM



FUNCTION TABLE

(Each Gate)

Inputs	Output
A	Y
H	L
L	H

LM339/LM339A LINEAR INTEGRATED CIRCUIT

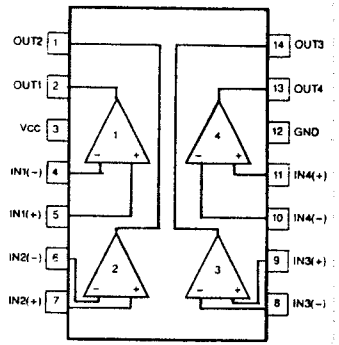
QUAD DIFFERENTIAL COMPARATORS

The LM339/LM339A series consists of four independent voltage comparators that are designed to operate from a single power supply over a wide range of voltages.

FEATURES

- Single supply or dual supplies
- Wide range of supply voltages 2 – 36V
- Low supply current drain 800 μA Typ.
- Open collector outputs for wired and connectors
- Low input bias current 25nA Typ.
- Low input offset current 5nA Typ.
- Low input offset voltage 2mV Typ.
- Common mode input voltage range includes ground.
- Low output saturation voltage
- Output compatible with TTL, DTL and MOS

BLOACK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

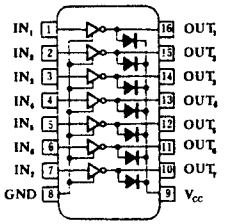
Characteristic	Symbol	Value	Unit
Supply Voltage	V_{CC}	36	V
Differential Input Voltage	V_{IN}	±36	V
Output Current	I_O	20	mA
Power Dissipation	P_d	1.0	W
Operating Temperature	T_{OPT}	0 ~ +70	°C
Storage Temperature	T_{stg}	−65 ~ +150	°C

IR2C19 7-Unit 400mA Darlington Transistor Array

Description

The IR2C19 is a 7-circuit driver. The internal clamping diodes enable the IC to drive the inductive load directly. Input characteristics are specified to match the SHARP one-chip microcomputer SM550 series and CMOS logic IC.

Terminal Connections



Top View

Features

1. High output current I_{OUT} = 400mA (MAX.)
2. High output breakdown voltage BV_{CEO} = 45V (MAX.)
3. Directly driveable by CMOS
4. Internal output clamping diode
5. Darlington construction
6. 16-pin dual-in-line package

Absolute Maximum Ratings

Parameter	Symbol	Condition	Rating	Unit
Supply voltage	V_{CC}		45	V
Output current *1	I_{OUT}	Each circuit	400	mA
Input voltage	V_{IN}		45	V
Collector-emitter breakdown voltage	BV_{CEO}		45	V
Forward current	I_F	For clamp diode	40	mA
Max. forward current	I_{FM}	For clamp diode	400	mA
Load inductance	L_L		100	mH
Power dissipation	P_D	Ta ≦ +25°C	650	mW
Derating ratio		Ta > +25°C	6.5	mW/°C
Operating temperature	T_{OPT}		−25 ~ +75	°C
Storage temperature	T_{stg}		−55 ~ +150	°C

*1 Duty cycle: 10% or less, repetitive frequency: 10Hz or more

Recommended Operating Conditions

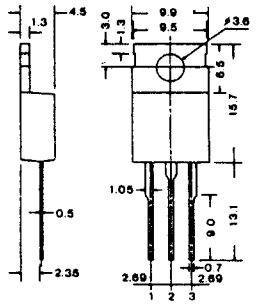
Parameter	Symbol	Condition	Rating	Unit
Output voltage	V_{CEO}		45	V
Output current	I_{OUT}	at 10% duty	0 ~ 400	mA
		at 50% duty	0 ~ 150	

MC78XXC/MC78XXAC SERIES LINEAR INTEGRATED CIRCUIT

3-TERMINAL 1A POSITIVE VOLTAGE REGULATOR

The MC78XXC series of three-terminal positive regulators is available in TO-220 package and with several fixed output voltages, making it useful in a wide range of applications. These Regulators can provide local on card regulation, eliminating the distribution problems associated with single point regulation. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

TO-220 Unit : mm



1. Input 2. GND 3. Output

FEATURES

- Output Current up to 1.5A
- Output Voltages of 5; 6; 8; 12; 15; 18; 20; 24V
- Thermal Overload Protection
- Short circuit protection
- Output Transistor SOA Protection

ELECTRICAL CHARACTERISTICS MC7805C

(Refer to the test circuits, T_J = 0 to 125°C, I_O = 500mA, V_I = 10V, C_I = 0.33μF, C_O = 0.1μF unless otherwise specified)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Voltage	V_O	T_J = 25°C	4.8	5	5.2	V
		I_O = 5mA to 1A, P_O 15W V_I = 8 to 20V	4.75	5	5.35	
Line Regulation	ΔV_O	T_J=25°C, V_I = 7 to 25V		3	50	mV
		T_J=25°C, V_I =8 to 12V		1	25	
Load Regulation	ΔV_O	T_J=25°C, I_O = 5mA to 1.5A			100	mV
		T_J = 25°C, I_O = 250 to 750mA			25	
Quiescent Current	I_d	T_J = 25°C			6	mA
Quiescent Current Change	ΔI_d	I_O = 5mA to 1A			0.5	mA
		V_I = 8 to 25V			1.3	
Output Voltage Drift	$\frac{\Delta V_O}{\Delta T}$	I_O = 5mA		-1.1		mV/°C
Output Noise Voltage	e_N	B=10Hz to 100KHz, T_J = 25°C		40		μV
Supply Voltage Rejection	SVR	f = 120Hz, V_I = 8 to 18V	62			dB
Dropout Voltage	V_d	T_J = 25°C		2		V
Output Resistance	R_O	f = 1KHz		17		mΩ
Short Circuit Current	I_{SC}	V_I = 35V, T_J = 25°C		750		mA
Short Circuit Peak Current	I_{SCP}	T_J = 25°C		2.2		

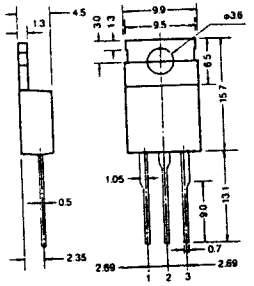
KSD288

NPN EPITAXIAL SILICON TRANSISTOR

POWER REGULATOR LOW FREQUENCY POWER AMPLIFIER

- Complement to KSA 614
- Collector-Base Voltage V_{CBO} = 80V
- Collector Dissipation P_C = 25W (T_C = 25°C)

TO-220 Unit : mm



1. Base 2. Collector 3. Emitter

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	V_{CBO}	80	V
Collector-Emitter Voltage	V_{CEO}	55	V
Emitter-Base Voltage	V_{EBO}	5	V
Collector Current	I_C	3	A
Collector Dissipation (T_C = 25°C)	P_C	25	W
Junction Temperature	T_J	150	°C
Storage Temperature	T_{stg}	−55~+150	°C

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage	BV_{CBO}	I_C = 500μA, I_E = 0	80			V
Collector-Emitter Breakdown Voltage	BV_{CEO}	I_C = 10mA, R_{BE} = 00	55			V
Emitter-Base Breakdown Voltage	BV_{EBO}	I_E = 500μA, I_C = 0	5			V
Collector Cut-off Current	I_{CBO}	V_{CB} = 50V, I_E = 0			50	μA
DC Current Gain	h_{FE}	V_{CE} = 5V I_C = 0.5A	40		240	
Collector-Emitter Saturation Voltage	V_{BE} (sat)	I_C = 1A, I_B = 0.1A			1	V

h_{FE} CLASSIFICATION

Classification	R	O	Y
h_{FE}	40-80	70-140	120-240

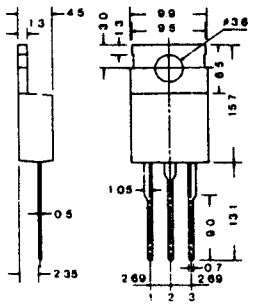
KSD73

NPN TRIPLE DIFFUSED SILICON TRANSISTOR

LOW FREQUENCY HIGH POWER AMPLIFIER

- Complement to KSB506
- Collector-Base Voltage V_{CBO} = 100V
- Collector Current I_C = 5A
- Collector Dissipation P_C = 40W (T_C = 25°C)

TO-220 Unit : mm



1. Base 2. Collector 3. Emitter

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	V_{CBO}	100	V
Collector-Emitter Voltage	V_{CEO}	60	V
Emitter-Base Voltage	V_{EBO}	5	V
Collector Current	I_C	5.0	A
Collector Dissipation (T_C = 25°C)	P_C	40	W
Junction Temperature	T	150	°C
Storage Temperature	T_{stg}	−55~+150	°C

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage	BV_{CBO}	I_C = 1mA, I_E = 0	100			V
Collector-Emitter Breakdown Voltage	BV_{CEO}	I_C = 20mA, R_{BE} =	60			V
Emitter-Base Breakdown Voltage	BV_{EBO}	I_E = 1mA, I_C = 0	5			V
Collector Cut-off Current	I_{CBO}	V_{CB} = 100V, I_E = 0			5	mA
DC Current Gain	h_{FE}	V_{CE} =10V, I_C = 1.0A	40		240	
Collector-Emitter Saturation Voltage	V_{CE} (sat)	I_C = 5A, I_B =0.5A			2.0	V
Base-Emitter Saturation Voltage	V_{BE} (sat)	I_C= 5A, I_B = 0.5A			1.5	V
Current-Gain-Bandwidth Product	f_T	V_{CE} = 10V, I_E = −0.3A		20		MHz
DC Base Voltage	V_{BE}	V_{CE} = 10V I_C = 1.0A		0.75		V

h_{FE} CLASSIFICATION

Classification	R	O	Y
h_{FE}	40-80	70-140	120-240

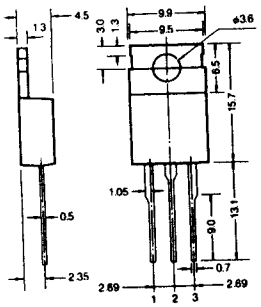
KSA473

PNP EPITAXIAL SILICON TRANSISTOR

LOW FREQUENCY POWER AMPLIFIER POWER REGULATOR

- **Complement to KSC1173**
- **Collector Current: I_C = −3A**
- **Collector Dissipation: P_C =10W (T_C =25°C)**

TO-220 Unit: mm



1. Base 2. Collector 3. Emitter

ABSOLUTE MAXIMUM RATINGS (T_a=25°C)

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	V_{CBO}	−30	V
Collector-Emitter Voltage	V_{CEO}	−30	V
Emitter-Base Voltage	V_{EBO}	−5	V
Collector Current	I_C	−3	A
Collector Dissipation (T_C =25°C)	P_C	10	W
Junction Temperature	T_J	150	°C
Storage Temperature	Tstg	−55 ~ +150	°C

ELECTRICAL CHARACTERISTICS (T_a=25°C)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage	BV_{CBO}	I_C = −500μA, I_E =0	−30			V
Collector-Emitter Breakdown Voltage	BV_{CEO}	I_C = −10mA, I_B =0	−30			V
Emitter-Base Breakdown Voltage	BV_{EBO}	I_E =1mA, I_C =0	−5			
Collector Cut-off Current	I_{CBO}	V_{CB} = −20V, I_E =0			−1.0	μA
Emitter Cut-off Current	I_{EBO}	V_{EB} = −5V, I_C =0			−1.0	μA
DC Current Gain	h_{FE} (1)	V_{CE} = −2V, I_C = −0.5A	70		240	
	h_{FE} (2)	V_{CE} = −2V, I_C = −2.5A	25			
Collector-Emitter Saturation Voltage	V_{CE} (sat)	I_C = −2A, I_B = −0.2A		−0.3	−0.8	V
Base-Emitter On Voltage	V_{BE} (on)	V_{CE} = −2V, I_C = −0.5A		−0.75	−1.0	V
Current Gain Bandwidth Product	f_T	V_{CE} = −2V, I_C = −0.5A		100		MHz
Output Capacitance	Cob	V_{CB} = −10V, I_E =0, f=1MHz		40		PF

h_{FE} CLASSIFICATION

Classification	O	Y
h_{FE} (1)	70-140	120-240

KSC945
NPN EPITAXIAL SILICON TRANSISTOR

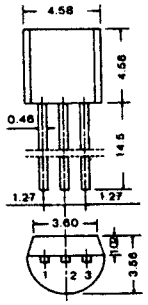
AUDIO FREQUENCY AMPLIFIER
HIGH FREQUENCY OSC.

Complement to KSA733

Collector-Base Voltage V_{CBO} = 50V

High Current Gain-Bandwidth Product f_T = 300MHz (Typ)

TO-92 Unit :mm



1. Emitter 2. Base 3. Collector

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	V_{CBO}	50	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	5	V
Collector Current	I_C	150	mA
Collector Dissipation	P_C	250	mW
Junction Temperature	T_J	125	°C
Storage Temperature	T_{stg}	−55 ~ +125	°C

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage	BV_{CBO}	I_C = 100μA, I_E = 0	50			V
Collector-Emitter Breakdown Voltage	BV_{CEO}	I_C = 10mA, R_{BE} =	40			V
Emitter-Base Breakdown Voltage	BV_{EBO}	I_E = 10μA, I_C = 0	5			V
Collector Cut-off Current	I_{CBO}	V_{CB} = 40V, I_E = 0			0.1	μA
Emitter Cut-off Current	I_{EBO}	V_{EB} = 3V, I_C = 0			0.1	μA
DC Current Gain	h_{FE}	V_{CE} = 6V, I_C = 1.0mA	70		700	
Collector-Emitter Saturation Voltage	V_{CE} (sat)	I_C = 30mA, I_B = 3mA		0.08	0.2	V
Current-Gain-Bandwidth Product	f_T	V_{CE} = 6V, I_E = 10 mA		300		MHz
Output Capacitance	C_{ob}	V_{CB} = 6V, I_E = 0		2.5		pF
		f = 1MHz				
Common Source Noise Figure	NF	V_{CE} = 6V, I_E = −0.5mA		4.0		dB
		f = 1KHz, Rg = 500Ω				

h_{FE} CLASSIFICATION

Classification	O	Y	G	L
h_{FE}	70-140	120-240	200-400	350-700

PRINTER(CR-812A)

1. GENERAL SPECIFICATIONS

1-1. Features

The EPSON Digital Printer CR-800 Series is designed as a printer to be used exclusively for the cash register (ECR) and has the following features which match the ECR more than the conventional printers.

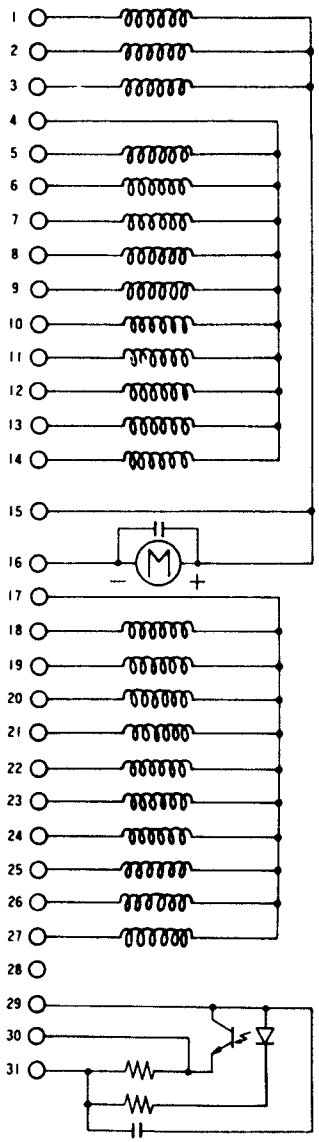
1. Independent paper feeding of receipts and journals and quick feeding of receipts are possible.
2. Stamp print and validation print can be conducted. (for CR-812 only)
3. Inking system using ink rollers.
4. Validation sensor is equipped. (option for CR-812 only) The printer also features that the printing system is a non-impact system and the sound is "zero" when the printer is in stand-by mode due to the intermittent motor drive.

1-2. Character Print Form

	10	9	8	7	6	5	4	3	2	1
0	VD	*	*	*	*	*	*	*	*	X
1	Ω	•	•	•	•	•	•	•	•	%
2	RT	–	–	–	–	–	–	–	–	ST
3										
4	CK	0	0	0	0	0	0,	0	0	#
5	I	I	I	I	I	I	I,	I	I	TL
6	2	2	2	2	2	2	2,	2	2	NS
7	3	3	3	3	3	3	3,	3	3	TS
8	4	4	4	4	4	4	4,	4	4	CG
9	CA	5	5	5	5	5	5,	5	5	AT
10	CH	6	6	6	6	6	6,	6	6	TII
11	(–)	7	7	7	7	7	7,	7	7	TI
12	RA	8	8	8	8	8	8,	8	8	Z
13	PO	9	9	9	9	9	9,	9	9	CD

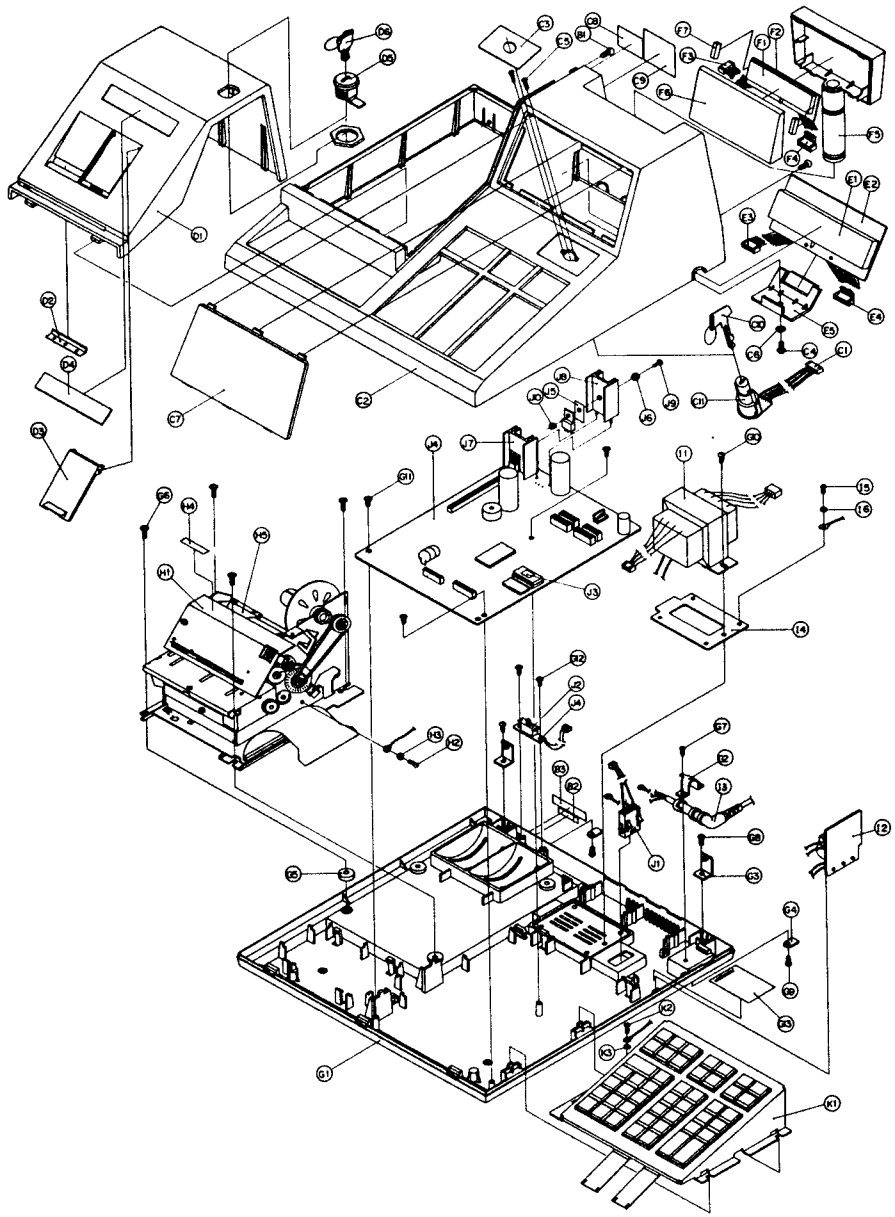
1-3. F.P.C Terminal Arrangement

Stamp trigger coil	1
J-side paper feeding trigger coil	2
R-side paper feeding trigger coil	3
J-side trigger magnet unit common wire (+)	4
J-side trigger magnet unit column No. 1	5
J-side trigger magnet unit column No. 2	6
J-side trigger magnet unit column No. 3	7
J-side trigger magnet unit column No. 4	8
J-side trigger magnet unit column No. 5	9
J-side trigger magnet unit column No. 6	10
J-side trigger magnet unit column No. 7	11
J-side trigger magnet unit column No. 8	12
J-side trigger magnet unit column No. 9	13
J-side trigger magnet unit column No. 10	14
Motor (+)/stamp trigger coil/paper feeding coil common wire (+)	15
Motor (–)	16
R-side trigger magnet unit common wire (+)	17
R-side trigger magnet unit column No. 1	18
R-side trigger magnet unit column No. 2	19
R-side trigger magnet unit column No. 3	20
R-side trigger magnet unit column No. 4	21
R-side trigger magnet unit column No. 5	22
R-side trigger magnet unit column No. 6	23
R-side trigger magnet unit column No. 7	24
R-side trigger magnet unit column No. 8	25
R-side trigger magnet unit column No. 9	26
R-side trigger magnet unit column No. 10	27
Empty	28
Detector power source (+5V)	29
Timing signal	30
Detector power source (GND)	31



NOTE: For the arrangement of F.P.C. terminals are numbered 31 . . . 1 from the ink roller holder side.

3. ASSEMBLY CONSTRUCTION & PARTS LIST



PART LIST

A. ASSY-ECR

NO	PART NO	DESCRIPTION/SPECIFICATION	Q'TY
	27098-150-101	SCREW-PH(WASHER); M5*10*PI10*T1.0 FEFZY	2
	2D901-701-041	DRAWER;A5504	1
	2D901-000-080	ASSY-ECR, BODY	1

B. ASSY-ECR, BODY

NO	PART NO	DESCRIPTION/SPECIFICATION	Q'TY
B1	27018-140-102	SCREW-FH;M4X10 FE FZW	2
B2	28114-128-110	LABEL-SERIAL;ART PAPER	1
B3	28114-750-100	LABEL-BATTERY.NEXT;ART PAPER 100GR	1
C	2D903-000-130	ASSY-CASE UPPER	1
D	2D903-000-140	ASSY-COVER PRINTER	1
E	2D903-000-150	ASSY-DISPLAY	1
F	2D903-000-160	ASSY-TURRET DISPLAY	1
G	2D903-000-170	ASSY-CASE LOWER	1
H	2D903-000-180	ASSY-PRINTER	1
I	2D903-000-190	ASSY-POWER, SUPPLY	1
J	2D903-000-200	ASSY-MAIN PWB	1
K	2D903-000-210	ASSY-KEY, BOARD	1

C. ASSY-CASE UPPER

NO	PART NO	DESCRIPTION/SPECIFICATION	Q'TY
C1	23344-501-207	CONNECTOR-HOUSING;XHP-7(420)	1
C2	26031-700-210	CASE-UPPER;ABS T3.0	1
C3	26404-700-310	PLATE-MODE S/W;PVC SHEET T0.3	1
C4	27148-540-101	SCREW-TAP RH;2S-4*10 FE FZY	1
C5	27158-526-101	SCREW-TAP PH(WASHER);2S-2.6*10*PI5*T0.5	2
C6	27308-204-001	WASHER-PLAIN;PI4.0 FEFZY	1
C7	27652-700-110	WINDOW-DISPLAY;ACRYL T3.0	1
C8	28034-700-710	LABEL-RATING;TETRON PAPER	1
C9	28114-750-300	LABEL-FCC;TETRON PAPER T0.1	1
C10	28344-100-010	KEY-"C";2K-71J-00	1
	28344-100-020	KEY-"P";2K-71J-01	1
	28344-100-030	KEY-"Z";2K-71J-03	1
	28344-100-040	KEY-"VD";2K-71J-07	1
	28344-100-050	KEY-"OP";2K-71J-15	1
C11	28344-100-310	KEY LOCK SWITCH;KSL-795FC01-71J	1

D. ASSY-COVER PRINTER

NO	PART NO	DESCRIPTION/SPECIFICATION	Q'TY
D1	26031-702-310	COVER-PRINTER;ABS T3.0	1
D2	26614-703-110	CUTTER-PAPER;SUS304-CP T0.3	1
D3	27653-701-310	WINDOW-JOURNAL;ACRYL T2.0	1
D4	28024-710-210	BRAND-PANEL; PVC SHEET T0.3	1
D5	28343-710-100	LOCK-KEY;WK-57(SIN DONG)	1
D6	28343-710-110	LOCK-C;WK-57-1(SIN DONG)	1

E. ASSY-DISPLAY

NO	PART NO	DESCRIPTION/SPECIFICATION	Q'TY
E1	22319-700-102	DIGITRON;FG1013RC1	1
E2	23023-701-310	PWB-DISPLAY; ER-2710	1
E3	23344-501-210	CONNECTOR-HOUSING;XHP-10(310)	1
E4	23344-501-211	CONNECTOR-HOUSING;XHP-11(310)	1
E5	26613-700-610	HOLDER-PWB DISPLAY;ABS(HB), BLACK T3.0	1
	26834-700-420	PAD-DIGITRON;RUBBER SPONGE T2.0	2

F. ASSY-TURRET DISPLAY

NO	PART NO	DESCRIPTION/SPECIFICATION	Q'TY
F1	22319-700-091	DIGITRON;FG98RD1	1
F2	23023-705-410	PWB-TURRET DISPLAY;ER-2710	1
F3	23344-501-209	CONNECTOR-HOUSING;XHP-9(400)	1
F4	23344-501-310	CONNECTOR-HOUSING;XHP-10(400)	1
F5	26032-700-300	TURRET-BODY;ABS	1
	26834-700-420	PAD-DIGITRON;RUBBER SPONGE T2.0	2
F6	27653-700-300	WINDOW-TURRET;ACRYL BLU	1
F7	28614-700-110	PAD-TURRET PCB;RUBBER SPONGE	2

G. ASSY-CASE LOWER

NO	PART NO	DESCRIPTION/SPECIFICATION	Q'TY
G1	26031-701-310	CASE-LOWER;ABS T3.0	1
G2	26604-700-500	HOLDER CORD;SBHG1 T1.0	1
G3	26604-700-600	BRACKET-CASING;SBHG1 T1.6	2
G4	26614-700-220	BRACKET-FOOT;SCP1 T1.6	2
G5	26834-705-110	CUSHION-PRINTER;NR(BLACK)	4
G6	27098-140-121	SCREW-PH(WASHER); +M4*12*PI9.0*T0.9 FE FZY	4
G7	27148-530-101	SCREW-TAP RH;2S-3*10 FE FZY	1
G8	27148-540-101	SCREW-TAP RH;2S-4*10 FE FZY	2
G9	27148-540-101	SCREW-TAP RH;2S-4*10 FE PZY	2
G10	27148-540-101	SCREW-TAP RH;2S-4*10 FE FZY	1
G11	27158-530-101	SCREW-TAP,PH(WASHER);2S-3*10*P17*T0.7 FEFZY	3
G12	27158-530-101	SCREW-TAP, PH(WASHER);2S-3*10*P17*T0.7 FEFZY	2
G13	28114-750-500	WARNING-MARK;ART PAPER 100GR ER-1710A(CRS)	1

H. ASSY-PRINTER

NO	PART NO	DESCRIPTION/SPECIFICATION	Q'TY
H1	24958-701-050	DIGITAL-PRINTER;CR-812A(130-03-1)	1
H2	27008-140-080	SCREW-PH;+M4*8 FE FZY	1
H3	27328-204-001	WASHER-TOOTHED;PI4.0 FEFZY	1
H4	28114-128-110	LABEL-SERIAL;ART PAPER	1
H5	28460-000-001	STAMP;RUBBER(30x20 T2.5)	1

I. ASSY-POWER, SUPPLY

NO	PART NO	DESCRIPTION/SPECIFICATION	Q'TY
	21018-257-105	R-CARBON;RD 1/4R 1M-J	1
	21509-139-104	C-POLYSTER;CQ922 M2J 104-K	1
	21509-140-222	C-POLYPROPYLENE;DTMB222J	2
I1	22869-100-400	TRANS-POWER;P:120V, S:19.5V,9.5V,26V	1
I2	23023-700-050	PWB-POWER;ER-2710	1
I3	23053-700-200	POWER CORD; ASSY:ER-1730	1
	23101-300-310	TERMINAL RING;170	1
	23101-300-410	TERMINAL RING; 355	1
	23101-300-610	TERMINAL RING;210*360*100	1
	23164-600-000	CLIP-FUSE ER-700;PBSS3 T0.3 5.4PI	2
	24529-500-100	LINE-FILTER;HL-38	1
	24709-009-010	FUSE;125V 1A (51NM-010-L)	1
I4	26624-700-510	PLATE-GROUND;SBHG1 T1.0	1
I5	27148-530-101	SCREW-TAP RH;2S-3*10 FE FZY	4
I6	27328-203-001	WASHER-T00THED;B-PI3.0 FE FZY	4

J. ASSY-MAIN PWB

NO	PART NO	DESCRIPTION/SPECIFICATION	Q'TY
	21018-427-102	R-CARBON;RD 1P 1K-J	1
	21049-101-752	R-METAL OXIDE;RS1W750J	2
	21099-100-000	R-ARRAY;100K*6 1/8 P-K	6
	21099-128-473	R-ARRAY;47KX8 1/8P-K	2
	21409-101-270	C-CERAMIC TEMP;CC45 SL 50V 47-J	2
	21409-105-210	C-CERAMIC, TEMP;CC45 CH 50V 30-J	2
	21419-109-140	C-CERAMIC, HK;CK45 F 50V 0.01M-Z	4
	21609-401-222	C-ELECTROLYTIC;CE04W10V220UF	1
	21609-401-500	C-ELECTROLYTIC;CE04W 16V 470M(SG TYPE)	3
	21609-401-630	C-ELECTROLYTIC;CE04W 35V 4.7M	2
	21609-402-270	C-ELECTROLYTIC;CE04W 50V 33M	1
	21609-402-280	C-ELECTROLYTIC;CE04W 50V 47M	1
	21609-402-380	C-ELECTROLYTIC;CE04W 50V 100M	1
	21609-402-400	C-ELECTROLYTIC;CE04W 35V 4700M	1
	21609-404-683	C-ELECTROLYTIC;CE04W40V6800M	1
	22109-111-139	IC-TTL;KS74HCTLS139	2
	22109-184-041	IC-CMOS;KS74HCTLS04	1
	22109-185-731	IC-CMODS;KS74HCTLS573	5
	22109-323-281	IC-EPROM;D27128	1
	22109-337-810	IC-NMOS LOGIC;UPD7810HG-36	1
	22109-413-686	IC-CMOS RAM;KM6264	1
	22109-414-990	IC-COMS;RP5C15	1
	22109-513-391	IC-LINEAR;LM339	1
	22119-302-205	IC-LINEAR;IR-2C05	3
	22119-502-419	IC-TR-ARRAY;IR2C19	4
	22139-103-441	TRANSISTOR;KSA733	1
	22139-103-473	TRANSISTOR;KSA473-Y	2
	22139-302-650	TRANSISTOR;KSC945-G	7
	22149-401-270	TRANSISTOR;KSD288-Y	3
	22169-201-060	DIODE; 1N4002	4
	22169-301-100	DIODE-BRIDGE;W02M	1
	22169-301-200	DIODE-BRIDGE;2KBP02	1
	22169-401-200	DIODE-ZENER;DZW-20B (1W)	1

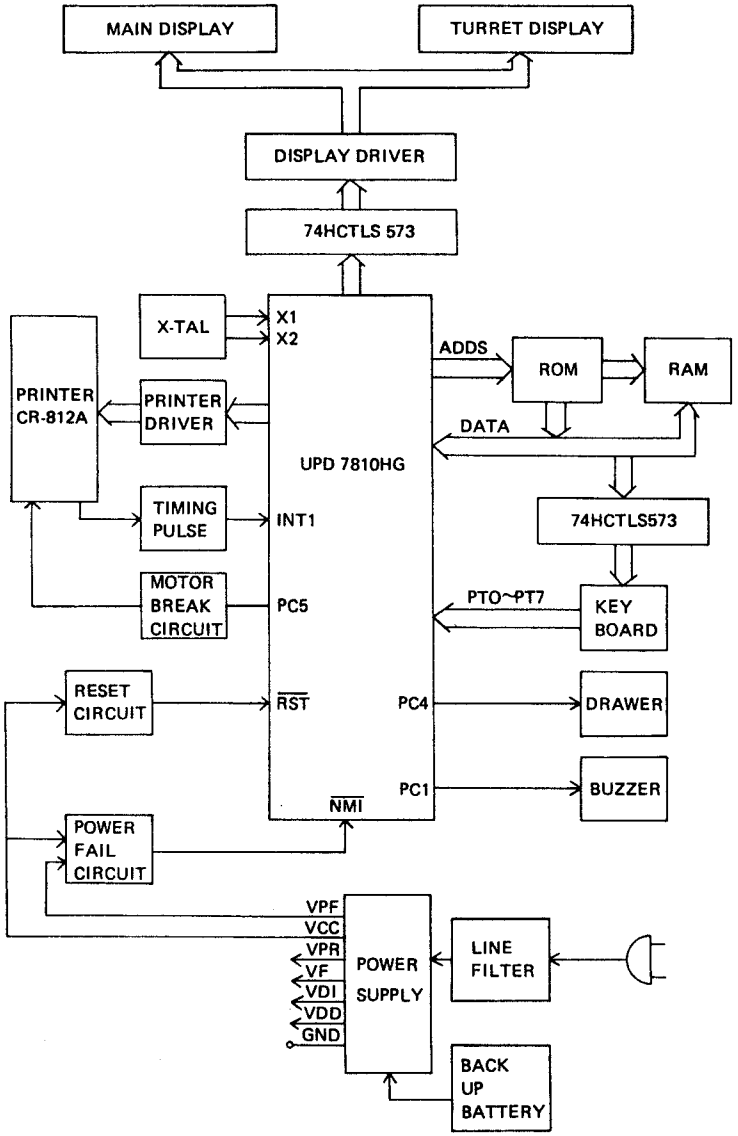
NO	PART NO	DESCRIPTION/SPECIFICATION	Q'TY
	22169-401-300	DIODE-ZENER;DZW-30B (1W)	1
	23344-300-303	FDZ-CONN;08FDZ-BT	2
	23344-400-410	CONNECTOR POST;B4B-XH-A	1
	23344-401-002	CONNECTOR-POST;B2B-XH-A	1
	23344-401-007	CONNECTOR-POST;B7B-XH-A	1
	23344-401-009	CONNECTOR-POST;B9B-XH-A	1
	23344-401-010	CONNECTOR-POST;B10B-XH-A	2
	23344-401-011	CONNECTOR-POST;B11B-XH-A	1
	23344-501-302	CONNECTOR-HOUSING;XHP-2(540)	1
J1	23344-601-006	DRAWER-CONNECTOR ASSY;	1
	24709-010-020	FUSE:52S-020-L	1
	23344-601-004	SOCKET-HOUSING;W-E 2103-1N#02	0
	23344-700-040	CONNECTOR-MALE;B 4P-VH	1
	23344-700-310	CONNECTORS-F.P.C;FF-31-001	1
	23354-300-280	SOCKET-IC;28PIN	1
J2	23519-066-110	SW-SLIDE;KSA-2202	1
	24209-700-010	BUZZER-PIEZ0;PB 5V	1
	24539-001-060	CRYSTAL-QUARTZ;KF-38 32768HZ	1
	24539-019-140	CRYSTAL; 14MHZ	1
	24709-010-010	FUSE;52NM-010-L	1
	24719-006-010	BATTERY-NICAD;3/60DK	1
J3	28114-701-110	ROM PROTECTOR;MOJO PAPER 120GR	1
	20509-400-105	WIRE SO, COPPER; TA 0.6 SN	1
	21018-277-101	R-CARBON;RD 1/4T 100J	1
	21018-277-102	R-CARBON;RD 1/4T 1K-J	1
	21018-277-103	R-CARBON;RD 1/4T 10K-J	5
	21018-277-104	R-CARBON;RD 1/4T 100K-J	2
	21018-277-221	R-CARBON;RD 1/4T220-J	1
	21018-277-222	R-CARBON;RD 1/4T 2.2K-J	4
	21018-277-472	R-CARBON;RD 1/4T 4.7K-J	6
	21018-277-562	R-CARBON;RD 1/4T 5.6K-J	6
	21018-277-681	R-CARBON;RD 1/4T 680-J	3
	21018-277-682	R-CARBON;RD 1/4T 6.8K-J	1
	22169-107-410	DIODE-SWITCHING; 1N4148 TAP	13
J4	23023-300-210	PWB-MAIN;ER-2710	1
	22119-104-357	REGULATOR;MC7805C	1
	22149-440-073	TRANSISTOR;KSD73-Y	1
J5	23914-100-340	PLATE-MICA;5-13X19 T0.09 RECT	1
	23914-100-340	PLATE-MICA;5-13X19 T0.09 RECT	1
J6	23934-700-210	INSULATOR-TR;NYLON 66	1
	23934-700-210	INSULATOR-TR;NYLON 66	1
J7	25684-700-410	HEAT-SINK;AL6063 H30	1
J8	25684-700-420	HEAT-SINK;AL6063 H45	1
J9	27008-130-081	SCREW-PH;+M3X8 FE FZY	1
	27008-130-081	SCREW-PH;+M3X8 FE FZY	1
J10	27208-123-001	NUT-HEX;2-M3 FE FZY	1
	27208-123-001	NUT-HEX;2-M3 FE FZY	1

K. ASSY-KEY, BOARD

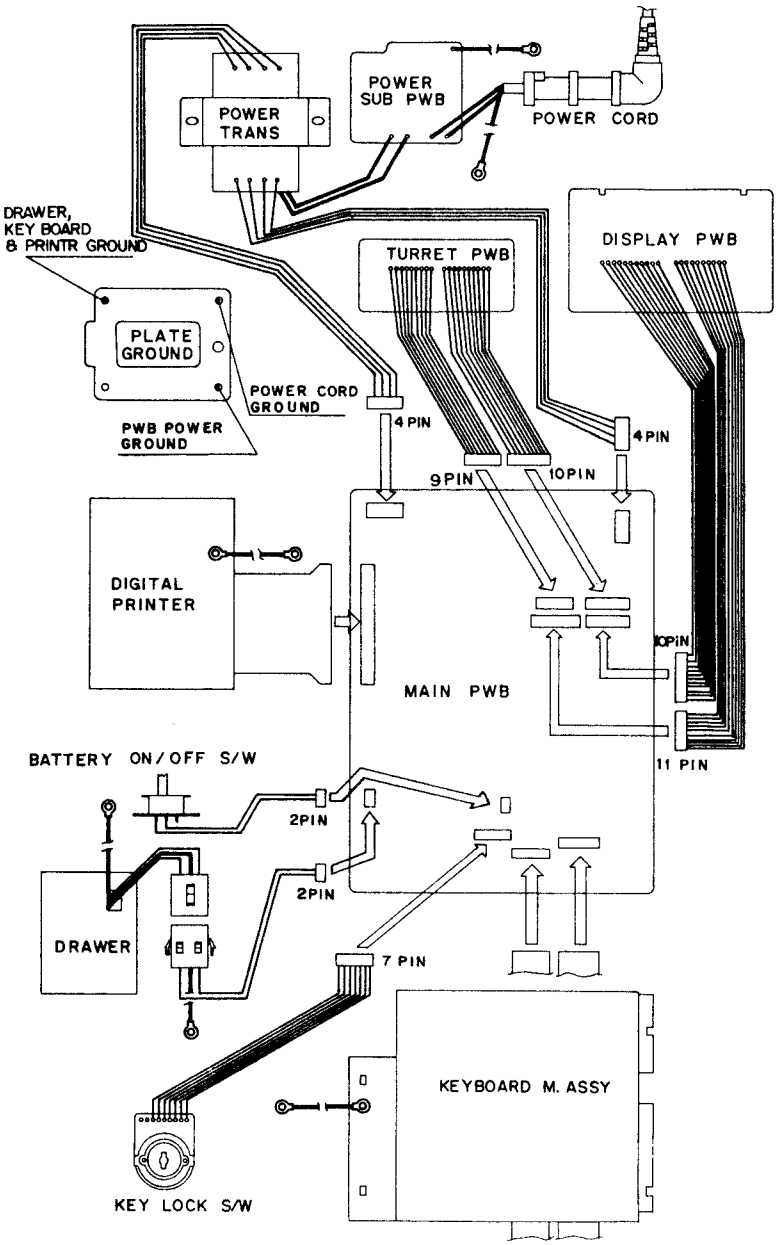
NO	PART NO	DESCRIPTION/SPECIFICATION	Q'TY
K1	23553-700-610	KEY-BOARD ASSY;MEMBRANE ER-2710	1
K2	27148-530-101	SCREW-TAP RH;2S-3*10 FE FZY	1
K3	27328-203-001	WASHER-TOOTHED;B-PI3.0 FE FZY	1

4. APPENDIX

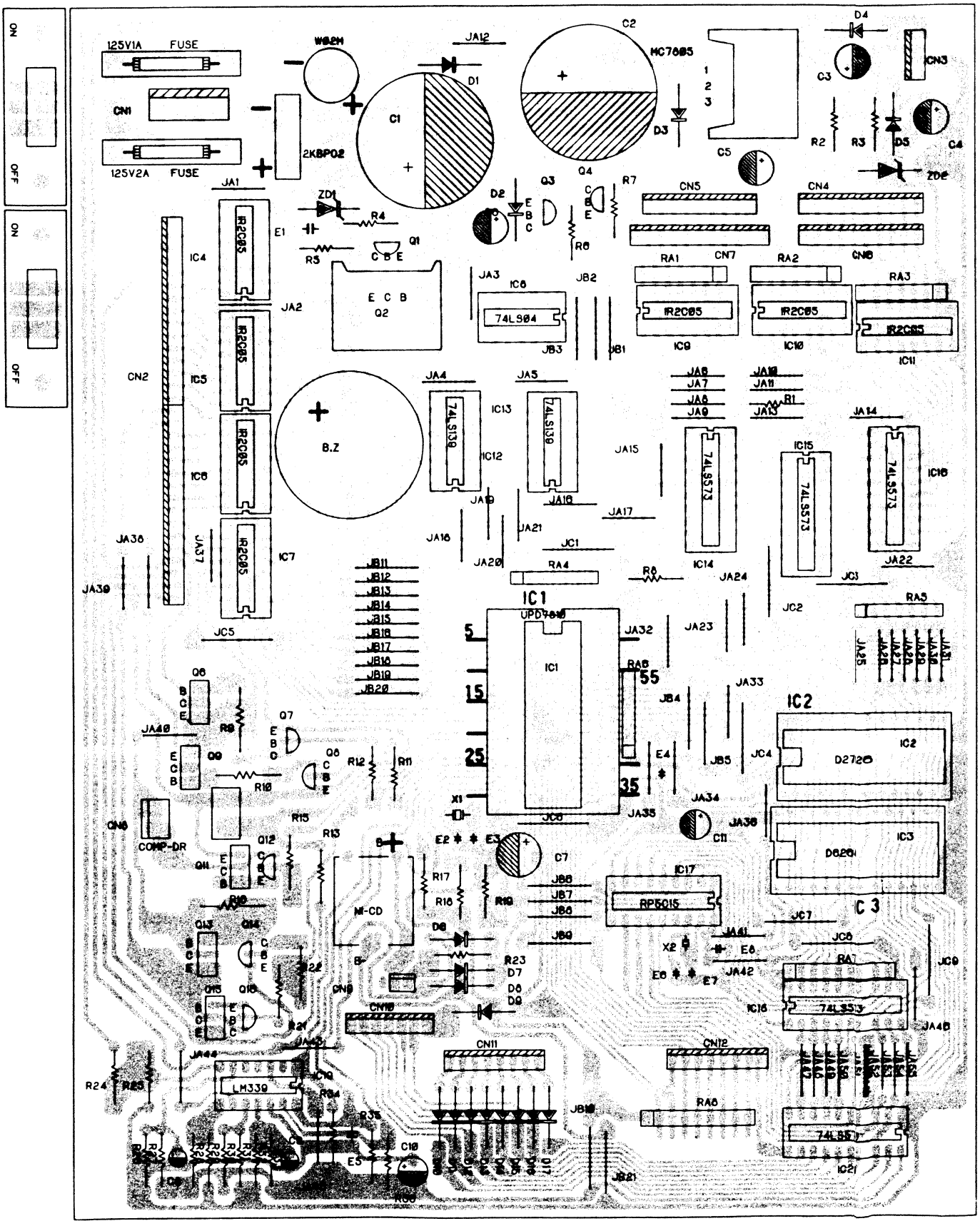
A) BLOCK DIAGRAM



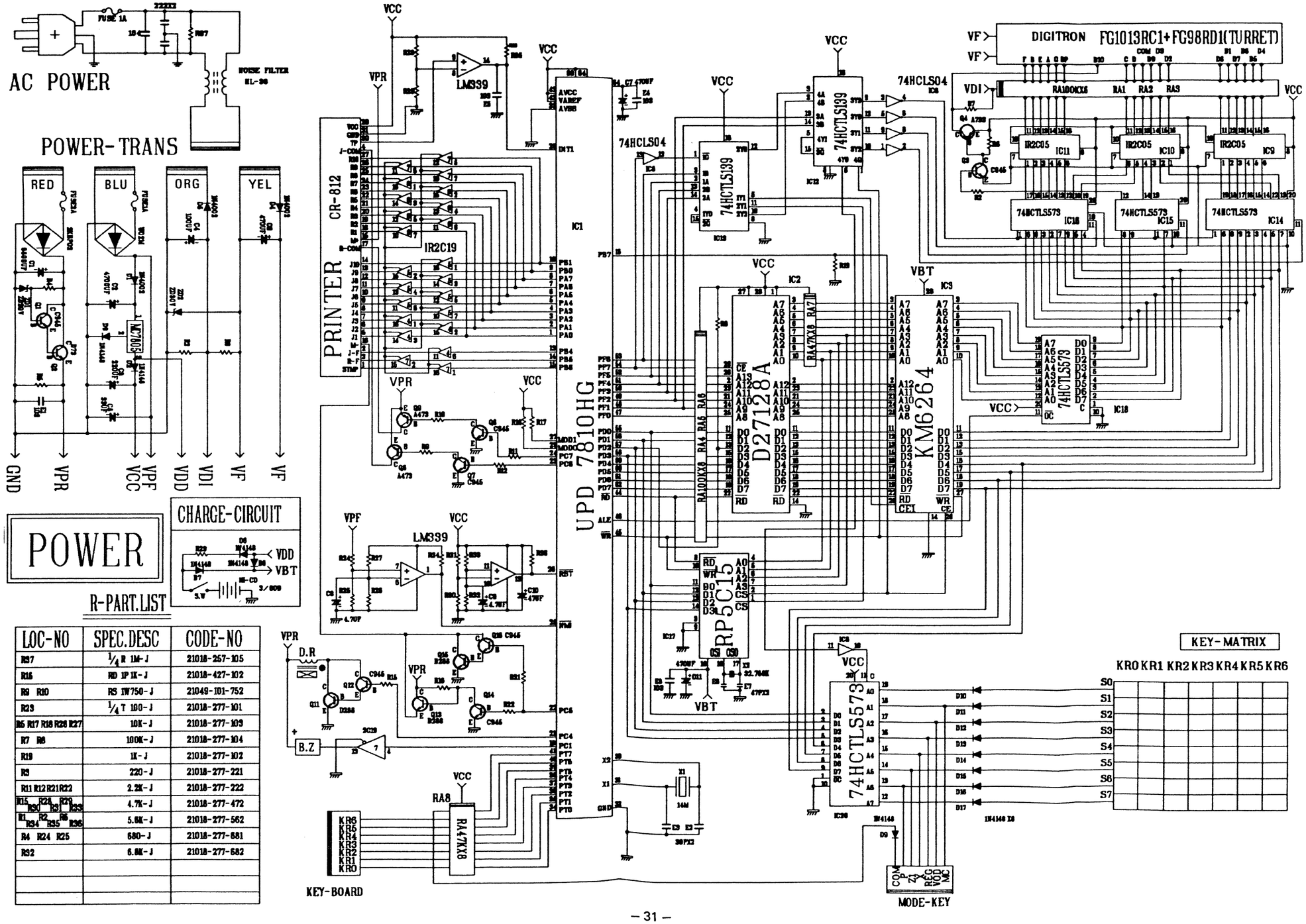
B) WIRING DIAGRAM



C) PARTS LAYOUT ON MAIN P.C.B.



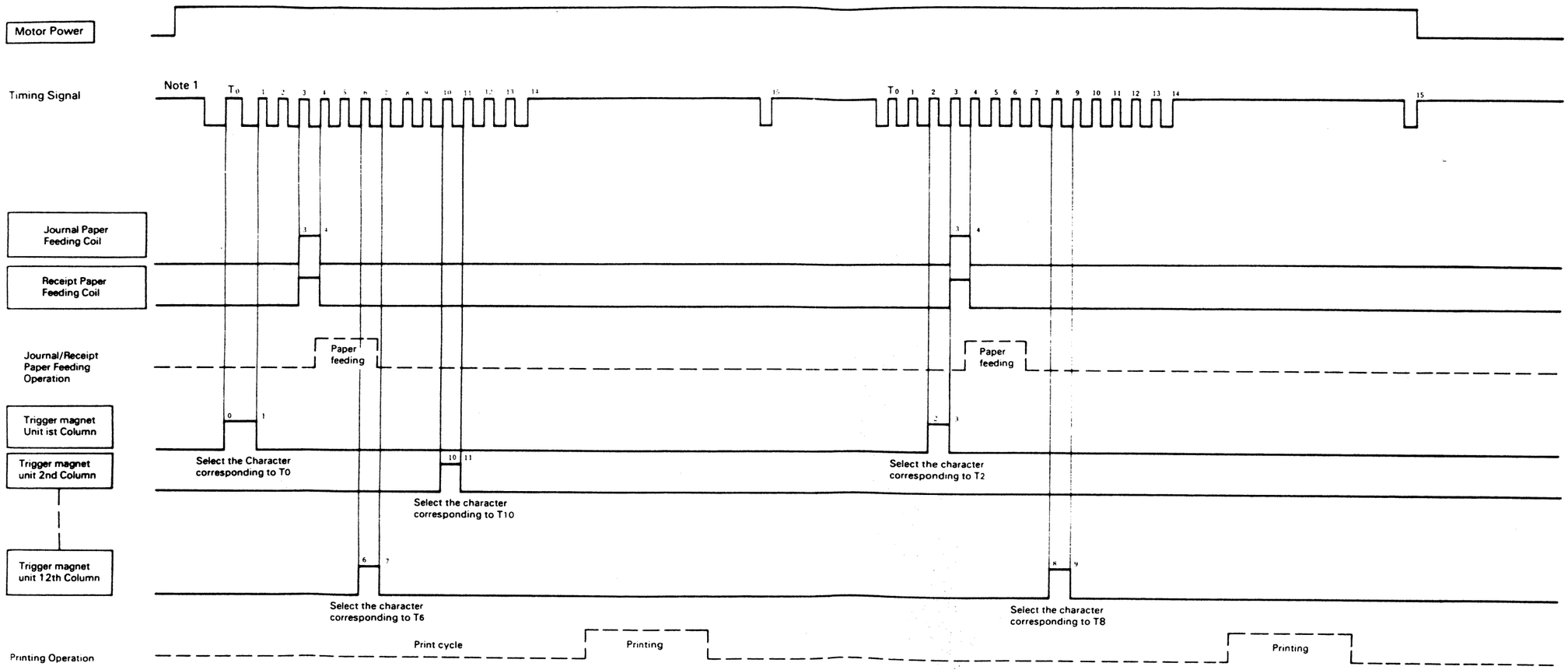
D) CIRCUIT DIAGRAM



LOC-NO	SPEC.DESC	CODE-NO
R57	1/4 R 1M- J	21018-257-105
R16	RD 1P 1K- J	21018-427-102
R9 R10	RS 1W750- J	21049-101-752
R23	1/4 T 100- J	21018-277-101
R5 R17 R18 R26 R27	10K- J	21018-277-103
R7 R8	100K- J	21018-277-104
R19	1K- J	21018-277-102
R3	220- J	21018-277-221
R11 R12 R21 R22	2.2K- J	21018-277-222
R15 R24 R29 R30 R31 R32 R33	4.7K- J	21018-277-472
R1 R34 R2 R35 R6 R36	5.6K- J	21018-277-562
R4 R24 R25	680- J	21018-277-681
R52	6.8K- J	21018-277-682

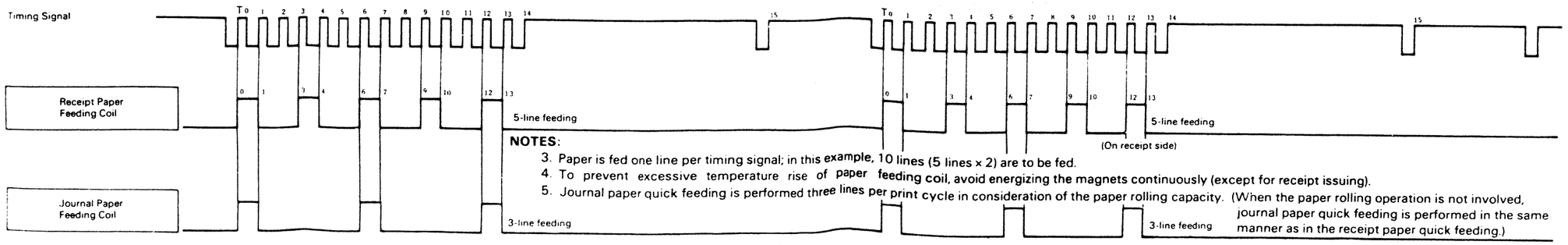
E) PRINTER TIMING CHART

(1) Timing Chart for Papar Feeding and Printing



NOTES:
1. When the motor has been stopped simultaneously with T_{15} in the preceding print cycle, the timing signal appearing upon the next application of motor power is at HIGH level.
2. At the start or end of energization of each magnet, the time delay from the rising edge of a timing signal must be not more than 0.5ms.

(2) Timing Chart for Quick Feeding



NOTES:
3. Paper is fed one line per timing signal; in this example, 10 lines (5 lines x 2) are to be fed.
4. To prevent excessive temperature rise of paper feeding coil, avoid energizing the magnets continuously (except for receipt issuing).
5. Journal paper quick feeding is performed three lines per print cycle in consideration of the paper rolling capacity. (When the paper rolling operation is not involved, journal paper quick feeding is performed in the same manner as in the receipt paper quick feeding.)

The signals enclosed in [ ] are to be provided by the user.

F) PRINTER ASSEMBLY/DISASSEMBLY DIAGRAM